Remarks

In the final Office Action dated December 18, 2008, claims 1, 3-4, 8-14, 17-18, and 23-29 are pending and claims 1, 3-4, 8-14, 17-18, and 23-29 stand finally rejected. The Applicant has not amended the claims in this Response. The Applicant traverses the rejection set forth by the Examiner.

35 USC § 103 Rejection

The Examiner rejected claims 1, 3-4, 8-14, 17-18, and 23-29 under 35 USC § 103(a) as being unpatentable over US Patent Number 6,048,050 (Gundlach), in view of various combinations of US Patent Application Publication Number 2002/0126167 (Kimura), US Patent Number 6,158,884 (Murakami), US Patent Number 6,695,439 (Takahashi), US Patent Number 6,932,458 (Howkins), US Patent Number 5,227,814 (Mutou), and US Patent Number 6,224,193 (Minemoto).

Claim 1 recites an apparatus for electrorheological printing. The apparatus comprises a pressurized ink chamber in fluid communication with a nozzle and configured to contain an electrorheological ink, where the nozzle includes electrodes for controlling a discharge of the electrorheological ink. The apparatus additionally includes an electrode arrangement configured to create an electric field within the nozzle using a first circular electrode at an inlet to the nozzle and a second circular electrode at an outlet of the nozzle to control a rate of discharge of the electrorheological ink through the nozzle. The electrode arrangement is further configured to create a first magnitude electric field within the nozzle sufficient to stop the discharge of the electrorheological ink through the nozzle and configured to create, within the nozzle, a second magnitude electric field lower than the first magnitude electric field to permit electrorheological ink to discharge through the nozzle. The apparatus additionally includes a stimulator configured to generate a synchronization signal to increase the pressure in the pressurized ink chamber to allow the discharge of the electrorheological ink through the nozzle when the electric field created within the nozzle is less than or equal to the second magnitude electric field. The stimulator is further configured to generate a synchronization signal to increase the pressure in the ink chamber to prevent the discharge of the electrorheological ink through the nozzle when the electric field created within the nozzle is greater than or equal to the first magnitude electric

field. The apparatus additionally includes a pair of conductive plates aligned in parallel with a path of the electrorheological ink from the outlet of the nozzle to modify the path of the electrorheological ink from the outlet of the nozzle.

First, the Applicant submits that there is no motivation to combine Kimura with Murakami and Gundlach in rejecting claim 1, as suggested by the Examiner, because the combinations render Murakami and Gundlach inoperable. MPEP 2143.01 (V) states: "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Kimura discloses discharging a non-rheological ink from a nozzle by pressurizing an ink chamber with a piezoelectric element. In Kimura, electrical signals are applied to the piezoelectric element to discharge a drop of ink. Kimura does not disclose electrorheological ink or means for preventing the discharge of the pressurized ink from the ink chamber using electric fields formed in the nozzle. Instead, Kimura discloses that ink is always discharged when the ink chamber is pressurized.

Murakami discloses rheological ink in a non-pressurized ink chamber (FIG. 2; ink supply tank 9 has an ink level 9a below hole 14 as indicated by P). In Murakami, when a positive potential voltage is applied between a first control electrode 15 and a metal platen 18, the electric force overcomes the surface tension of the ink and ink is discharged (FIG. 2; Column 12, lines 38-46; ink surface 9b). Murakami further discloses that a negative voltage potential can be applied to the ink surface 9b such that no ink particle flies. The Applicant submits that there is no teaching or suggestion in Murakami that the electric forces are sufficient to prevent pressurized ink from being discharged from hole 14. For example, there is no suggestion that the negative potential applied to prevent ink ejection is operable to do so when the ink is pressurized. Instead, the Applicant submits that Murakami teaches away from a pressurized ink chamber because the ink level 9a in the ink tank 4 is below the ink surface 9b as indicated by P. Thus, hydrostatically, the ink chamber does not apply pressure to the ink surface at hole 14. Instead, capillary action draws ink into the hole, and surface tension (absent electrostatic forces) prevents ink ejection. This is further illustrated in FIG. 8 and in Column 15, lines 25-33, which discusses that the ink surface is at a negative hydrostatic pressure because the ink surface in the supply tank is below the ink surface in the hole. Thus, the Applicant submits that pressurizing the ink

chamber in Murakami would cause the uncontrolled ejection of ink, thus rendering Murakami inoperable. Therefore, the Applicant submits that there is no motivation to modify the unpressurized rheological ink system of Murakami with the pressurized non-rheological ink system of Kimura, as suggested by the Examiner.

Gundlach discloses an unpressurized electrorheological ink having a free surface along an opening near an acoustic lens. In order to eject ink, the acoustic lens focuses acoustical energy onto the free surface 26, causing ink to be ejected from the opening (FIG. 1; Column 3, lines 30-40). In order to inhibit ink ejection, an electric field is formed across the opening, which increases the viscosity of the electrorheological ink. The increased viscosity prevents the acoustical energy focused on the free surface 26 of the ink from ejecting ink. In Gundlach, there is no teaching or suggestion that the electric field formed across the opening is operable to prevent the discharge of pressurized ink. Instead, Gundlach discloses that the electric field formed across the opening is operable to prevent the focused acoustical energy from ejecting the ink. Thus, the Applicant submits that pressurizing the ink chamber in Gundlach would cause the uncontrolled ejection of ink, rendering the Gundlach invention inoperable. Therefore, the Applicant submits that there is no motivation to modify the unpressurized rheological ink system of Gundlach with the pressurized non-rheological ink system of Kimura, as suggested by the Examiner.

Second, the Applicant submits that the Examiner has used impermissible hindsight reasoning using the Applicant's own disclosure as a template to piece together art to render the pending claims obvious. The Applicant reminds the Examiner that the pending claims must be viewed "only based on knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made" that "does not include knowledge gleaned only from applicant's own disclosure." (*In re McLaughlin* 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971). Because one skilled in the art would recognize that combining Kimura with Murakami and Gundlach would be inoperable, the Applicant submits that the Examiner could only arrive at such a combination using impermissible hindsight.

Conclusion

For at least the reasons provided, the Applicant respectfully requests withdrawal of the § 103 rejection and allowance of claims 1, 3-4, 8-14, 17-18, and 23-29.

Respectfully submitted,

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